

PROCESSES OF CHANGE ASSOCIATED WITH THE FRUIT AND VEGETABLE CONSUMPTION ACROSS STAGES OF CHANGE IN WOMEN- APPLICATION OF TRANSTHEORETICAL MODEL

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ABSTRACT

BACKGROUND

Consumption of fruits and vegetables is associated with the reduction of many chronic diseases. Transtheoretical model is one of the most common models used for studies on nutrition. The objective of this study is to evaluate the processes of change across stages of change for fruits and vegetables consumption.

MATERIALS AND METHODS

600 literate women of Gilan-e-Gharb city (a west part of Iran) who were selected by random sampling method participated in this cross-sectional study. Data gathering tools was a questionnaire that consisted of 30 questions which included demographic (n= 5), stages of change (n= 5) and processes of change (n= 20) as well as 24 hours recall questionnaire for fruits and vegetables consumption. We assessed the internal consistency questions using Cronbach's Alpha and validity by S-CVI. Statistical analysis used: Data were analysed by SPSS 19 using the T-test, ANOVA and Chi-square.

RESULTS

The majority of subjects (89.5%) belonged to the passive stages of change (pre-contemplation, contemplation and preparation) and only 10.5 percent were in active stages (action and maintenance). Average daily consumption of fruits and vegetables was 3.4 ± 0.96 servings, which was lowest in pre-contemplators and increased until the maintenance stage (p < .001). Mean score of cognitive and behavioural processes were higher in maintenance stage and lower in pre-contemplation stage.

CONCLUSION

Given the important role of the cognitive and behavioural processes in promoting people from passive stages to active stages of change, we suggest implementation of these processes by using appropriate strategies in educational intervention for promoting consumption of fruits and vegetables.

KEYWORDS

Fruit, Processes of Change, TTM, Vegetable.

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BACKGROUND

Consumption of fruits and vegetables is associated with the reduction of many chronic diseases such as heart disease, stroke, hypertension, diabetes and some of cancers.^[1,2] Inadequate levels of fruits and vegetables is one of the important modifiable risk factors that contribute to the increasing global burden of chronic diseases.^[3] According to the World Health Organisation (WHO) recommendation, women should consume at least 400 g of fruits and

vegetables per day and this value should be approximately 7 percent of daily calorie intake.^[4]

Limited studies on the consumption of fruit and vegetable in Kermanshah province (the west part of Iran) indicated that fruit and vegetable intake is lower than nutritional recommendations.^[5-7] Even when there is no difficulty to access and provision of fruits and vegetables, some people have insufficient consumption. Therefore, it seems that the psychological reasons can explain this issue.

Transtheoretical model (TTM) is one of the most popular models of health education and health promotion, which has been recognised as one of the methods to identify and change the diet, especially for fruits and vegetables.^[8,9] TTM with the integration of processes of change in the stages of change tries to explain the psychosocial reasons of adopting or changing behaviour.^[8] The core construct of this model is stages of change according to which when people are going to adopt or change a behaviour passes through a series of

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predictable stages including pre-contemplation, contemplation, preparation, action and maintenance.^[10]

The second construct of TTM is processes of change and include strategies that people use to move through the stages of change.^[9] These processes were divided into two categories: the first group are the experimental processes (cognitive processes) which refer to experiments that emphasise on the thoughts, emotions and cognitive experiences and must be existing in the early stages of change including consciousness raising, dramatic relief, self-re-evaluation, environmental re-evaluation and social liberation. The second group are behavioural processes which focused on behaviours and reinforcement factors and often used in the action and maintenance stages including helping relationship, self-liberation, counter conditioning, stimulus control and reinforcement management.^[8,11,12] Integration of the stages of behaviour change with the processes of change helps us to understand when and how changes occur.^[13] Hence, the present study was conducted to investigate the processes of change across stages of change associated with the consumption of fruits and vegetables in the literate women of Gilan-e-Gharb city (the Kurdish part of Kermanshah province; located in the west of Iran). Women were selected as the target group for this study, because they have an important role in maintaining the health of children and other family members as mothers as well as comprise about half of the population in the community.^[14]

MATERIALS AND METHODS

This cross-sectional study was conducted with participation of 600 women aged 18 - 59 years in a Kurdish urban population under the coverage of health centre of Gilan-e-Gharb city.

Inclusion criteria consisted of the marriage, ability to read and write Persian language, residing in the Gilan-e-Gharb city as well as voluntary consent to participate in research. We excluded women who had disease or condition that requires contraindications or low consumption of fruits and vegetables. Participants were selected by systematic random sampling method in February and March of 2015. After explaining the purpose of research and ensuring the confidentiality of information, the informed consent form was obtained from individuals and then they completed questionnaires about 30 minutes.

Measures

Data gathering tool in this study was a four-part questionnaire, which was completed anonymously by the participants. Demographic questions located in the first section consisted of age, job, education, number of children and number of family members. The second part consisted of five questions related to the stages of change for fruit and vegetable consumption according to which individuals were placed in one of five stages including pre-contemplation, contemplation, preparation, action and maintenance. By default people in the pre-contemplation, contemplation and preparation stages consume less than five servings of fruits and vegetables per day and in action and maintenance stages consume more than five servings per day. The third part consisted of twenty questions, related to processes of

behaviour change for fruit and vegetable consumption which were allocated two questions for each process (Table 1). Participants were asked to rate using a 5-point Likert scale (e.g. 1= "strongly disagree," 5= "strongly agree") for 20 items. Finally, we used the 24-hour recall standard questionnaire to assess the consumption of fruits and vegetables.

Panel of experts approved Content Validity Index (CVI) and Content Validity Ratio (CVR) of items. The questionnaire was represented to 60 women to assess the test-retest reliability after two weeks that the correlation between test and retest was 0.92. In addition, we assessed the internal consistency of process of changing questions using Cronbach's Alpha, which was 0.73. Data analysed by Statistical Package for Social Sciences (SPSS) version 19 using Central indicators, Chi-square, Independent T-Test and ANOVA.

RESULTS

In total, 600 women participated in the study. The subjects' mean age was 33.16 (\pm 7.6) years. Average number of household members was less than four people (3.76, SD= 1.24). As shown in Table 2, the majority of the subjects were housewives and had under high school diploma education. More details about demographic characteristics of the subjects were presented in Table 2.

Table 3 shows average daily consumption of fruits and vegetables in the subjects, which was 3.4 ± 0.96 servings per day. The consumption was lowest in precontemplators and increased to maintenance stage ($P < .001$).

Based on the results showed in Figure 1, the majority of women (89.5%) were in passive stages of change for consumption of fruits and vegetables and only 10.5 percent were in the active stages (action and maintenance).

Table 3 shows that mean score of cognitive processes in the maintenance stage is significantly more than other stages and in precontemplators was significantly less than other stages ($p < 0.001$). The post-hoc test (Tukey) showed that there was no significant difference between mean score of cognitive processes in action stage with preparation and contemplation stages. In addition, mean score of behavioural processes from precontemplation to maintenance stage had increasing trend and post-hoc test (Tukey) showed that mean score of these processes in the maintenance stage was higher than other stages as well as in action and preparation, and contemplation stages were more than precontemplation stage.

According to the results showed in Table 4, mean scores of cognitive processes (except for the process of consciousness rising) and behavioural processes in the maintenance stage is significantly more than precontemplation stage. About the consciousness raising process, significant difference between precontemplation and maintenance stages was not found. Results of one-way ANOVA showed that mean score of each of the processes at different stages had significant differences and about dramatic relief, self-re-evaluation, reinforcement management, social liberation and environment re-evaluation significantly had increased from passive stages to active stages.

Process Name	Theoretical Definition	Question Sample
Cognitive (Experimental) Processes		
Consciousness raising	Increasing awareness via information, education and personal feedback about the healthy behaviour	I am looking for information through the media and advertising about the benefits of fruits and vegetables
Dramatic relief	Experiencing the negative emotions (fear, anxiety, worry) that go along with particular behavioural risks	I think to the warnings about low consumption of fruits and vegetables
Self-reevaluation	Assessment of one's self-image with and without a particular unhealthy habit	I blame myself when I do not consume enough fruits and vegetables
Environmental re-evaluation	How the presence or absence of a personal habit affects one's social environment	I am concerned to this point that the lack of fruits and vegetables in my food plan has a negative impact on my family members
Social liberation	Society is more supportive of the healthy behaviour	Today, women have more attention to the consumption of fruits and vegetables
Behavioural Processes		
Helping relationship	Seeking and using social support for the recommended behaviour change	I have people who remind me about the consumption of fruits and vegetables
Self-liberation	Believing in one's ability to change and making commitments and recommitments to act on that belief	I say to myself that if I want I can eat more fruits and vegetables
Counter conditioning	Substitution of recommended alternative behaviours and cognitions for the problem behaviour	Instead of eating junk food, I prefer to eat fruits and vegetables as snacks
Stimulus	Using reminders and	I place something in the

control	cues that encourage healthy behaviour as substitutes for those that encourage the unhealthy behaviour	house to remind me that I should eat more fruits and vegetables
Re-inforcement management	Increasing the rewards for the positive behaviour change and decreasing the rewards of the problem behaviour	If I take more fruits and vegetables, I am encouraged by others

Table 1. Processes of Behaviour Change based on TTM

Characteristic	No. (%) of Participants
Education	
<12	272 (45.3)
=12	230 (38.3)
>12	98 (16.4)
Age	
18-34	325 (54.2)
35-49	254 (42.3)
50 and above	21 (3.5)
Number of Children	
0	113 (18.8)
1	114 (19)
2	241 (40.2)
3 and above	132 (22)
Job	
Housewife	534 (89)
Employee	66 (11)

Table 2. Description of the 600 Study Participants

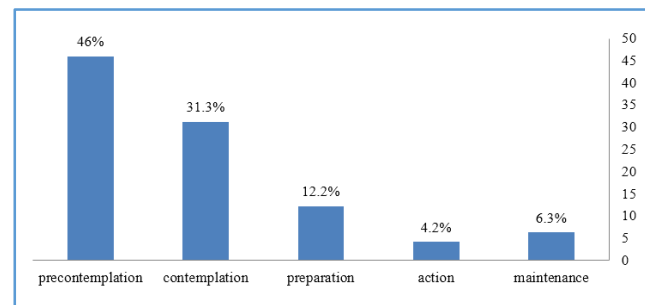


Figure 1. Distribution of the Subjects across Stages of Change of the Fruits and Vegetables Consumption

Variable	Stages of Change					Total	Test
	PC	C	P	A	M		
Experiential processes	39.87a ±4.22	41.30b ±3.24	42.88c ±2.94	41.62b, c ±3.0	45.54d ±2.90	41.12 ±3.98	F=26.64 P < .001
Behavioural processes	34.44a ±4.11	36.47b ±4.16	35.94b ±3.80	37.09b ±5.29	41.33c ±3.10	35.80 ±4.42	F=27.42 P < .001
Consumption (Serving per day)	2.93a ±0.57	3.29b ±0.54	3.48c ±0.44	5.02d ±0.69	5.95e ±0.47	3.40 ±0.96	F=313.48 P < .001

Table 3. Processes of Change and Consumption of Fruits and Vegetables

P indicates precontemplation, C- contemplation, P- preparation, A- action and M- maintenance. Means with differing superscript letters are significantly different at p < 0.05 by Tukey HSD post-hoc.

Variable	Stages of Change					Total	Test
	PC	C	P	A	M		
Consciousness raising	8.50 ^a ±1.13	8.75 ^b ±1.10	9.30 ^c ±1.19	9.03 ^{b, c} ±.60	8.5 ^{a, b} ±.99	8.70 ±1.13	F=8.09 P < .001
Dramatic relief	7.78 ^a ±1.45	8.13 ^b ±.92	8.27 ^b ±.79	8.48 ^{b, c} ±1.12	8.90 ^c ±1.19	8.05 ±1.24	F=9.69 P < .001
Environment re-evaluation	7.56 ^a ±1.77	7.88 ^b ±1.22	8.01 ^b ±.91	8.33 ^b ±1.39	9.51 ^c ±.64	7.87 ±1.53	F=16.72 P < .001
Self-re-evaluation	7.76 ^a ±1.38	8.05 ^b ±1.23	8.43 ^c ±1.30	8.19 ^c ±1.20	9.0 ^d ±1.45	8.02 ±1.36	F=9.89 P < .001
Social liberation	8.24 ^b ±1.35	8.50 ^c ±1.07	8.84 ^d ±1.26	7.62 ^a ±.60	9.66 ^e ±.80	8.47 ±1.27	F=16.37 P < .001
Self-liberation	7.47 ^a ±1.60	7.56 ^a ±1.85	7.51 ^a ±1.95	8.33 ^b ±1.62	8.46 ^b ±.85	7.6 ±1.71	F=9.74 P= .003
Counter conditioning	7.82 ^a ±1.61	7.94 ^a ±2.15	7.91 ^a ±2.11	7.71 ^a ±2.24	8.89 ^b ±1.57	7.93 ±1.89	F=2.92 P= .021
Helping relationship	7.0 ^a ±1.63	7.47 ^b ±1.50	6.88 ^a ±1.62	6.81 ^{a, b} ±2.23	7.9 ^c ±1.71	7.19 ±1.46	F=5.20 P < .001
Reinforcement management	5.43 ^a ±1.50	6.01 ^b ±1.09	6.09 ^b ±1.46	7.0 ^c ±2.01	8.05 ^d ±1.67	5.92 ±1.57	F=33.78 P < .001
Stimulus control	6.72 ^a ±1.76	7.47 ^{b, c} ±1.64	7.56 ^{b, c} ±1.55	7.24 ^{a, b} ±1.40	8.02 ^c ±2.03	7.16 ±1.65	F=9.59 P < .001

Table 4. The Mean Score of Processes of Change across Stages of Behaviour Change

DISCUSSION

In the present study, the majority of subjects were classified in passive stages of fruit and vegetable consumption and only 10.5 percent of participants were in action and maintenance stages (Active stages), which were consuming five and above servings of fruits and vegetables. In two similar studies, 65 and 66 percent of people were in active stages.^[15,16] In other studies, people in active stages were more than in the present study.^[12,17-19] It seems that lower education and higher household members are important factors in distribution of people across stages of change for fruit and vegetable consumption in this study.

Average consumption of fruit and vegetable from precontemplation to maintenance increased. This result confirms the hypothesis that consumption of fruits and vegetables in the stages of change is different and increase from lower stages (Passive stages) to higher stages (Active stages). This result is consistent with other similar studies.^[12,15-17] Assessment of fruits and vegetables consumption based on Transtheoretical Model allows us to adjust our intervention both on the stages of change and on the number of consumed servings, and have a more targeted intervention.

In the present study, the mean score of cognitive (experimental) processes was different at the various stages of behaviour change. Mean score of this variable was higher in people at maintenance stage and lower in precontemplators. According to Di Carmo study, mean score of cognitive processes in maintenance, action and preparation stages was higher than contemplation and precontemplation.^[20] In other similar studies, cognitive processes in precontemplators were lower than other stages of behaviour change.^[15,18]

Given to the special role processes of behaviour change in the transtheoretical model and in order to correct analysis of the processes, in the following we discuss each of the processes of change separately to examine their relationships, similarities and contradictions and possible reasons for them.

Consciousness raising process that refers to searching information and people's willingness to get news and information^[8, 11] was lower in precontemplators compared to contemplation, preparation and action stages. This result is consistent with the nature of precontemplators. According to Prochaska et al, precontemplators tend to avoid reading, talking or thinking about their high-risk behaviours.^[21] Educational intervention for promoting people from precontemplation to contemplation stage, this process could be used effectively.

We measured the dramatic relief process with phrases related to attention and emotional arousal to warnings about low consumption of fruits and vegetables, so results showed that there were most emotional motivation in people at maintenance and lowest in precontemplators. This finding is similar to results from same studies.^[15,20,22] These results confirmed that it is better the health messages be designed in a way that help people to leave the precontemplation stage, for example to some extent induce fear of the consequences due to the lack of consumption of fruits and vegetables (especially precontemplators). In this context Prochaska et al has introduced methods such as psychodrama, role-playing and media campaign.^[8,21]

Environmental re-evaluation process was referred to the negative or positive impacts of adopting behaviour on family and social environment.^[8] Mean score of this process in precontemplators was the lowest and in maintenance stage was the highest. According to Greene et al, precontemplators have reported the lowest adoption of this process and there was no significant difference between other stages.^[15] In educational interventions based on Transtheoretical model, the three mentioned processes are important as targeted processes to promoting people from the precontemplation to the contemplation stage.^[8,21]

Self-re-evaluation process in health education program is considered for promoting people from contemplation to preparation with methods such as enhanced self-concept, positive mental imagery and introducing healthy role models.^[8,21] The result of present study showed that this process was higher in preparation stage than contemplation.

According to the defined relationships between the processes and stages of behaviour change,^[8] the higher rate of self-re-evaluation in the preparation stage was compared to precontemplation and contemplation stages seems logical, because this process is the main strategy for the promotion of people from the contemplation to the preparation stage. People in preparation stage because of the motive and serious intention to adopt behaviour in the near future perhaps have a more positive image of the new behaviour and the results of this study indicated this issue.

The latest cognitive process, which was investigated in this study was social liberation. This process had the highest rate in the maintenance and lowest in the action stage. We were not able to offer the documented justification for this. However, we can say that individuals in action stage are in transition from adopting healthy behaviour to maintain it. More people at lower stage report they received less social support from other women related to consuming more fruits and vegetables.

The self-liberation as the first behavioural process was more in maintenance and action stages than precontemplation, contemplation and preparation. In a study by Greene, this process in precontemplators has been less than the other stages.^[15] To promoting individuals from preparation to action stage, it is necessary to understand people's ability to change behaviour and enhance their self-efficacy. In addition, it is better that individuals have two or three options to choose as alternatives to test their ability to select the options.^[15]

Counterconditioning process is applied, especially to promote the individuals from the action stage to maintenance. In this study, the mean score of this in maintenance phase was more than any other stages. The people who responded to the two questions showed that they used fruits and vegetables as snacks more than other people.

The third behavioural process was helping the relationship, which was highest in maintenance stages and lowest in precontemplation and preparation. Hildebrand et al have emphasised on important role of helping relationships and social support for increasing the consumption of fruits and vegetables.^[18] In a study by Kim in relation to smoking cessation behaviour, among the process of behaviour change helping relationships has been introduced as the most important predictor of smoking cessation.^[23]

Reinforcement management process as the most important behavioural processes is the most used process for promoting individual from the action stage to the maintenance.^[21] In this study, the mean score of this process was the lowest compared to other processes, which represents low incentives and motives of the subjects. This process was also different in the various stages of change and in the active stage (Action and maintenance) was more than passive stages.

The last behavioural process that was investigated in this study was the process of stimulus control. This process refers to removing the unpleasant stimulus and adding favourable incentives to the environment.^[8] In this study, decorating fruits and vegetables in beautiful containers for people pleasantly was studied as a form of stimulus control. The results showed that people in precontemplation and contemplation stages have paid less attention to this process compared to the other stages. People of these stages given

that no real motivation to change behaviour and likely do not have a clear plan for behaviour change, fewer have adopted this behaviour process compared to the other people. Putting some stimulus at home (such as installing a poster in relation to the use or availability of fruits and vegetables in the refrigerator) is a form of stimulus control.

CONCLUSION

The study results showed that the average consumption of fruits and vegetables is not according to nutritional recommendations and is less than five servings per day. Hence, it is better to perform more researches on the causes and factors influencing the consumption of fruits and vegetables. From other important results of this study, we can refer to the significant differences between women's readiness to consumption of enough fruits and vegetables. The results showed the significant differences in the extent and manner of adopting the cognitive and behavioural processes by individuals in different stages of change. Both types of processes (Cognitive and behavioural) were more in active stages. Therefore, we suggest that a special attention be given to some practical strategies to upgrade the people from passive stages to the action and maintenance stages. Some of these cognitive strategies are included to provide information to raise awareness, emotional arousal for dramatic relief and pointing out the disadvantages of small amounts of fruits and vegetables in the diet of the family. In addition, some behavioural strategies include control of negative stimuli and provide positive incentives to promote the consumption of fruits and vegetables, replacement of fruits and vegetables instead of junk food and providing supportive relationships for people. These findings remind the health managers and health education professionals the necessity of attention to individual differences in health education programs. In other words, we must avoid the same training for different audiences, and design and implement targeted training programs according to the characteristics of the audiences.

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